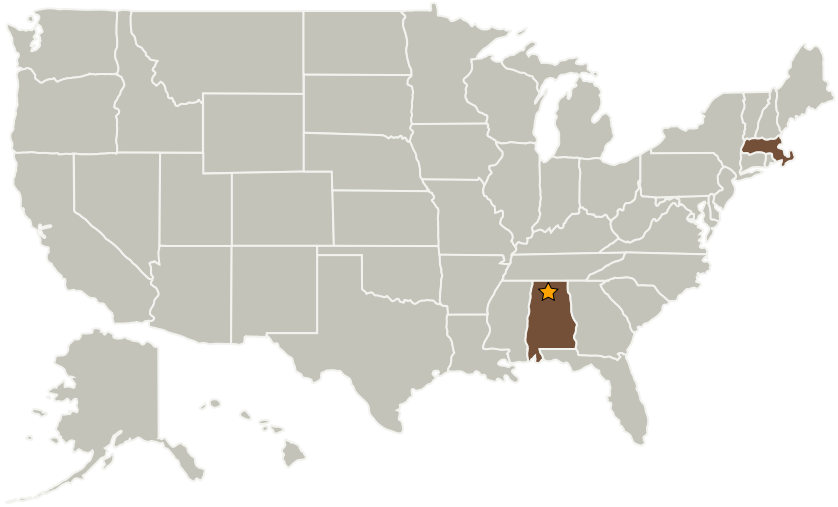
Low-Cost, Silicon Carbide Replication Technique for LWIR Mirror Fabrication, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

SSG proposes an innovative optical manufacturing approach that will enable the low-cost fabrication of lightweighted, Long Wave Infrared (LWIR) Silicon Carbide (SiC) mirror substrates. The approach proposed is a modification of SSG's slip casting forming process which has been demonstrated to produce aggressively lightweighted SiC optics. We propose to improve the process by applying innovative tooling that will allow us to replicate optical surfaces directly onto the SiC optics during the forming process. This approach will eliminate the costly and time consuming machining and polishing processes associated with traditional optical fabrication. The replication process we propose is different from standard replication processes in that it does not require any epoxy bonding layers. The final product will be as durable as traditional, monolithic SiC mirrors, and in this way will be suitable for space borne application. In Phase I we propose to produce a number of witness samples using the proposed forming process. Initially we intend to produce optical surfaces suitable for the 20 ? 40 micron waveband. The technology proposed will enable the production of large optical surfaces in a cost-effective manner, enabling multi-meter, deployable, LWIR optical systems, similar to JWST.

Primary U.S. Work Locations and Key Partners



Low-Cost, Silicon Carbide Replication Technique for LWIR Mirror Fabrication, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Low-Cost, Silicon Carbide Replication Technique for LWIR Mirror Fabrication, Phase I

Completed Technology Project (2005 - 2005)

Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
SSG Inc	Supporting Organization	Industry	Wilmington, Massachusetts

Primary U.S. Work Locations	
Alabama	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jay Schwartz

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.3 Electronics and Optics Manufacturing Process